Control of onion grass (romulea spp.) prior to resowing permanent pastures

G.J. Mitchell, S.R. Chinner and D.J. McQuinn

South Australian Department of Primary Industries Flaxley Research Centre, PO Box 1571, Flaxley SA5153
Du Pont (Australia) Ltd. 33 Magill Rd., Stepney SA 5069

Summary. Three field trials on acid soils investigated the use of metsulfuron methyl to control onion grass. Metsulfuron, applied at 6 g/ha a.i., provided satisfactory control at all sites, however efficacy was affected by timing of application. In two of the trials, the most effective timing resulted in significant improvements in the establishment of perennial grasses and subterranean clover sown in May of the following year.

Introduction

Two species of onion grass. Romulea rosea and R. minunflora, are major weeds in many run down pastures in the Mt. Lofty Ranges region of SA (P. Fairbrothcr, pers. comm.) and in the south-western districts of Victoria. R. rosea appears to be the more prevalent species in SA. Dense stands of onion grass can develop in the absence of pasture legumes, and we have recorded densities of up to 11,000 plants/m2 in the Mt. Lofty Ranges.

On a few occasions, onion grass has caused the deaths of dairy cattle in SA, with ingested material forming a fibrous ball and blocking the digestive tract. Onion grass has also been implicated with low lambing percentages on sheep farms in south-western Victoria (G. Saul, pers.comm.).

We do not consider onion grass to be a highly competitive weed, but one which can proliferate if environmental or management conditions cause a loss of legumes and perennial grasses from pastures. Cayley (2) describes onion grass as having a low requirement for phosphorus (P) for plant growth and found that onion grass dominance in south-western Victoria was associated with soils of low available P. He found that maintaining soil P levels (Olsen method) above lOppm virtually eliminated onion grass in pastures based on subterranean clover, *Trifoliwn subterraneum.*

Nonetheless, we believe that dense stands of onion grass can limit the establishment of introduced cultivars (particularly those with poor seedling growth) when infested pastures arc being renovated. Direct drilling is a popular renovation technique but glyphosate and paraquat/diquat herbicides, used in autumn for pre-seeding weed control, arc not effective on onion grass. Glyphosate does have some activity but the timing for effective control is at least at the two leaf stage (3), precluding the direct drilling of pastures before the end of June. Metsulfuron methyl has demonstrated efficacy on bulbous weeds (4) but generally kills pasture legumes growing *at* or soon after application. Metsulfuron can however, be applied at rates up to 12 g/ha a.i. in November without any residual damage to annual clovers sown the following May, on soils of $pH_{(H20)}$ less than 5.5 (5).

Methods

Three field trials were established to investigate the use of metsulfuron in *the* preceding year to control onion grass in newly sown pastures in the Mt. Lofty Ranges region. Infested sites were selected at Mt. Compass and Flaxley in June 1990, and at Tungkillo in June 1991. Site details are presented in Table I.

Table 1. Soil and rainfall details for trial sites

	Mt.Compass	Flaxley	Tungkillo
Soil type	deep, grey sand	soloth	red podzolic
Soil $pH_{(H20)}$	5.4	5.2	6.3
Mean annual rainfall (mm)	812	750	620
Sowing date	I 4.5.91	28.5.91	30.5.92
Pasture mix sown	Porto 5 kg/ha	Ellett 10 kg/ha	Porto 3 kg/ha
	Sirosa 2 kg/ha	Karridale 15 kg/ha	Sirosa 2 kg/ha
	Seaton Park 15kg/ha		Trikkala 10 kg/ha

A range of metsulfuron treatments, combining several application timings and rates, was applied to plots at each site in the year of site selection. Treatments were applied to plots measuring 2x 10 m at the Mt. Compass and Flaxley sites, and 3x15 m at Tungkillo. Trial designs were randomised complete block designs with three replicates. Treatments were applied through flat fan SS 11001 nozzles mounted on handheld booms delivering 150 IJha (Mt.Compass and Flaxley) or 100 lJha (Tungkillo). A non- ionic surfactant (Agral 60(D) was added to all spray treatments at 0.25% (v/v).

In the May of the following year, glyphosate herbicide was applied at 720 g/ha a.i. for general weed control. This timing corresponded to around four weeks after the opening seasonal rains at each site. Plots were sown nine to fourteen days later to mixes of: cocksfoot. *Dactylis glomerata* cv. Porto; phalaris, *Phalaris aquatica* cv. Sirosa; perennial ryegrass, *Loliton perenne* cv. Ellett; and/or subterranean clover, cvv. Seaton Park. Karridale or Trikkala. The specific mix for each site is defined in Table I.

Densities of onion grass plants and sown cultivar seedlings were measured at all sites two to three months after seeding. Quadrats measuring 25x40 cm were used, and plant counts were taken from four quadrats per plot at Mt. Compass and Flaxley, and from three quadrats per plot at Tungkillo. The density of the perennial weed sorrel. *Rumex acetosella.* was also measured at the Mt. Compass site.

Results and discussion

At all sites, one or more metsulfuron treatments significantly ($p<0.05$) reduced onion grass densities in pastures sown in the following year (Tables 2, 3 and 4). Applications of 3-6 g/ha a.i. in late July provided satisfactory control of onion grass (arbitrarily set at an 80% reduction in weed density) at Mt. Compass, yet the same rates applied in early September provided only 33-42% reductions. An application of 6 g/ha in early September was the only treatment to give satisfactory control at the Flaxley site. A trend apparent at Mt.Compass and Flaxley was that the efficacy of metsulfuron on onion grass decreased as applications were delayed beyond July and early September respectively. The efficacy of herbicides on the bulbous weed crow garlic, *Allium vineale,* is dependent on the timing of herbicide application in relation to plant growth (D. Lane, pers.comm.). He reported that herbicides are most effective on garlic plants after the parent bulb is exhausted (usually within 8 weeks of emergence) and before new underground bulbs have fully developed. Although onion grass plants develop only one new bulb each year (3), it is possible that a similar effect reduces metsulfuron efficacy on onion grass when applied late.

Table 2. Plant densities (number/m^2) for onion grass, sorrel and sown cultivars 64 days after seeding in the Mt. Compass trial

Metsulfuron treatment		Onion grass	Sorrel	Sown cultivars		
Rate g/ha a.i.	Application date			Sirosa	Porto	Seaton Park
0		942	84	34	69	53
3	26.7.90	243	204	71	218	178
6	26.7.90	213	181	81	229	163
3	4.9.90	627	139	53	144	74
6	4.9.90	551	115	44	132	117
3	27.9.90	552	126	56	138	106
6	27.9.90	485	167	44	108	103
3	30.10.90	872	117	36	97	66
6	30.10.90	812	92	30	91	75
l.s.d. (5%)		140	n.s.	28	53	34

Table 3. Plant densities (number/m^2) for onion grass and sown cultivars 49 days after Needing in the Flaxley trial.

Metsulfuron treatment		onion grass	Sown cultivars	
Rate g/ha a.i.	Application date		Ellett	Karridale
0		437	112	99
3	6.9.90	318	138	120
6	6.9.90	80	131	112
3	4.10.90	215	168	129
6	4.10.90	374	162	130
3	6.11.90	357	152	120
6	6.11.90	264	128	99
l.s.d. (5%)		186	n.s.	n.s.

Table 4. Plant densities (number/m^2) for onion grass, sorrel and sown cultivars 88 days after seeding in the Tungkillo trial

Metsulfuron treatment		onion grass	Sown cultivars		
Rate g/ha a.i.	Application date		Sirosa	Porto	Trikkala
0		9,548	17	30	24
9	1.8.91	28	58	64	43
6	6.9.91	118	42	70	32
9	6.9.91	61	46	59	34
6	27.9.91	225	25	77	38
9	27.9.91	84	39	68	31
l.s.d. (5%)		79	16	22	6

In contrast, all metsulfuron treatments applied at Tungkillo provided effective control. The greater efficacy of 6 g/ha metsulfuron at this site may be due to the lower soil acidity (pH of 6.3. compared to 5.2-5.4 at other sites), root uptake of metsulfuron increasing with increasing soil pH (1).

The more effective metsulfuron treatments provided significant ($p<0.05$) improvements in the initial establishment of phalaris, cocksfoot and subclover at the Mt.Compass and Tungkillo sites, with over 200% increases being recorded for one or more species at these two sites. At the Flaxley site however, where onion grass was initially less dense, satisfactory control of the weed did not significantly affect the establishment of perennial ryegrass or subclover. This suggests that control of onion grass stands of 400 or less plants/m^2 is not justified when direct drilling permanent pasture mixes.

Metsulfuron, at 6 g/ha a.i., is an effective herbicide for the control of onion grass in the season prior to autumn direct drilling of pastures on acid soils in the Mt.Lofty Ranges. Our data suggests spraying between late July and mid August. but further research on optimum timing is required.

References

1. Anon. 1987. Ally Herbicide Technical Information Bulletin (DuPont Aust. Ltd.)

2. Cayley, J. 1991. Research Review 1989-90 Pastoral Research Institute. Hamilton. (Eds. Cayley. J. Draffen, N. and Graham. J.) (Vic. Dept. Agric.) pp. 35-37.

3. Duckworth, N. 1984. Proc. 25th Annual Conf. Grasslands Soc. Vic.. Melb. p.86

4. Maslen, M.A.. Mitchell. G.J.. Matic. R. and Carter. P.A. 1988. Herbicide screening group 1987 report. Tech. Rep. No.I35 (SA Dept. Agric., Adel.) pp.39-40, 89-91.

5. Mitchell. G.J.. Chinner. S.R. and Colman. P.V. 1992. Plant Protection Quarterly. 7. 121-124.